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TECHNIQUE FOR MEASURING BODY CIRCUMFERENCES AND
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TECHNIQUE FOR MEASURING BODY CIRCUMFERENCES AND SKINFOLD THICKNESSES

M. B. BECKETT
J. A. HODGDON

REPORT NO. 84-39



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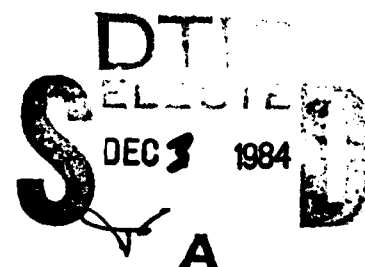
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**TECHNIQUE FOR MEASURING
BODY CIRCUMFERENCES AND SKINFOLD THICKNESSES**

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INTRODUCTION

Anthropometry is the science of measuring the human body. Information obtained through anthropometry can be used to describe a person's body build, to design equipment to match human body form, and to estimate body composition in terms of relative fat tissue and lean tissue masses. The purpose of this manual is to teach you to make two general types of anthropometric measures: the measurement of body circumferences, and the measurement of skinfold thicknesses. These types of measures are those most commonly used in the estimation of body composition. Furthermore, the particular measurement sites described in this manual are among those most commonly occurring in equations which predict body composition.

The manual is organized to provide first an overview of the type of measurement to be made (circumference or skinfold); second, a description of the equipment needed; third, general instructions on making the measurements; and fourth, a description of the actual sites with illustrations.

MEASUREMENT OF BODY CIRCUMFERENCES

Equipment and Procedure

A body circumference (girth) is defined as the length of a continuous line enclosing a certain area of the body. In common terms, it is the distance around the body or limb at a specified position. Circumferences are easy to measure, all that is required is a tape measure and paper and pen to record your measurements.

Tape Measure The tape measure should be made of a non-stretching material (fiberglass or steel, not cloth) and should be calibrated against a known length. Appendix A contains a list of tape measure manufacturers.

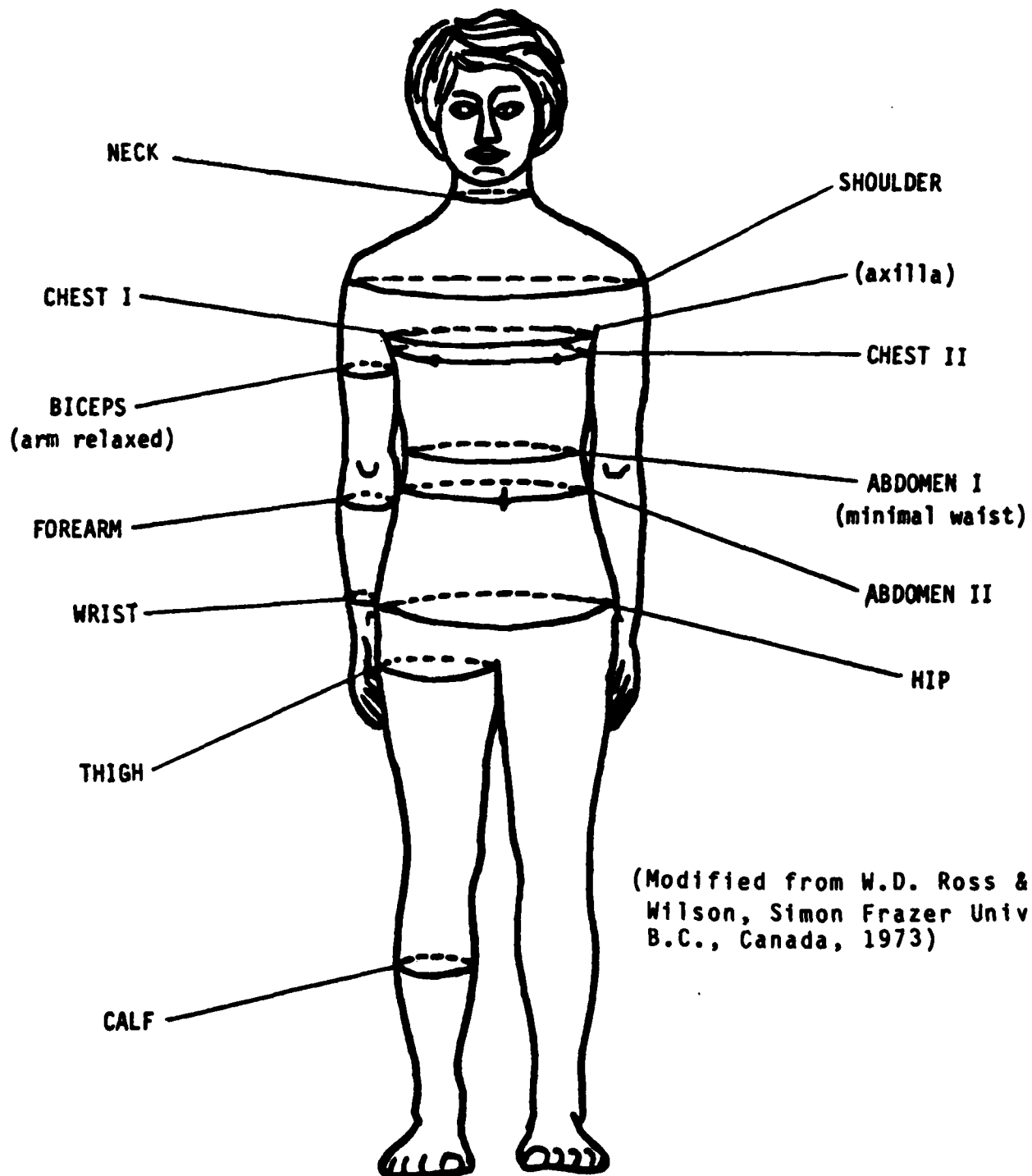
Measurements are more easily made if there is a loop or tab on the end of the measuring tape. If your tape measure does not have a loop or tab on the end make one by wrapping several thicknesses of transparent tape on the low-numbered end of the tape so that the tab extends down about 3/4 inch below the edge of the tape (Figure 1). Cut the transparent tape flush with the end of the tape measure.

Technique For ease and accuracy of measurement, male subjects (persons being measured) should wear swim suits or shorts and female subjects should wear "two-piece" swim suits. All circumferences are taken with the subject standing relaxed and facing the measurer (Figure 2), unless otherwise specified. Before reading the tape, it is important that the measurer observe both front and rear placements of the tape (a side view is good) to make sure that the tape is level. During measurement, you should apply sufficient pull on each end of the tape so that the tape conforms to the contours of the skin, but not so

Figure 1. MEASURING TAPE (with tab end)



Figure 2. CIRCUMFERENCE SITES



(Modified from W.D. Ross & N.C. Wilson, Simon Fraser Univ., B.C., Canada, 1973)

much tension so that the skin is indented. This is very important if you are to obtain a valid, reproducible measurement.

The most accurate and easiest way (once you get the hang of it) to handle the tape is depicted in a stepwise fashion in Figure 3. The description of this technique is easier to follow if you actually perform each step as you read it.

- 1) Face the subject and locate the site to be measured (in this example it is the sternal angle, see shoulder circumference site description) (Figure 3a).
- 2) Hold the tab end of the tape in your right hand. With your left hand, loop the tape around behind the site you are going to measure.
- 3) Hold the tape with your left hand 15 to 30 inches from the tab end. The exact distance will vary with the site to be measured. Hold the tape level and position it exactly behind the site to be measured (Figure 3b).
- 4) When you are sure that the tape is positioned properly bring both hands forward and then cross them in front of you. You will then need to change hand positions on the tape.
- 5) To do this, use your right hand to press the tape against the body with just enough pressure to hold it in place (Figure 3c).
- 6) With your left hand lay the tape under your right thumb, and grasp the tape between the right thumb and forefinger.
- 7) Release the tape with your left hand. You will now be holding the tape in position in your right hand (Figure 3d).
- 8) Take hold of the tab with your left hand and control the other end of the tape with your right hand. Both hands are now out of the way for reading the measurement (Figure 3e).
- 9) Observe both front and rear placement of the tape to make sure it is properly located (with respect to landmarks) and level all the way around.
- 10) Adjust the tension on the tape and read it to the nearest 0.1 cm (or 1/8 inch if the application calls for inches; 1 inch = 2.54 cm).

Figure 3. CIRCUMFERENCE TECHNIQUE
(Shoulder circumference)



(a) Finding the sternal angle



(b) Positioning the tape directly behind the
sternal angle and level with the floor

Figure 3. CIRCUMFERENCE TECHNIQUE (continued)



(c) Holding the tab end in place with right hand while preparing to switch hand positions



(d) Ready to take tab end with left hand



(e) Reading the tape

Measurement Recording. Measurements are recorded to the nearest 0.1 cm (or 1/8 inch). Care should be taken that the tape measure is read correctly. You must take at least two measurements at each site. Measure each site once in sequence (going from site to site), then repeat the whole series in order. Under ideal conditions the measurer will have an aide who will record measurements as well as observe tape placement for accuracy and level orientation. If measurements of the same site differ by 1 cm (or 3/8 inch) or more repeat that measure once more. The final measurement for a site is an average of all recordings for that site.

In order to obtain unbiased results, it is important for the measurer to be unaware of his/her previous measurements at each particular site. To accomplish this, the recorder should report only whether or not a third measurement is needed, not the actual previous values. If no recorder is available, the measurer should use a piece of paper to mask previous recordings while taking the second and, if necessary, third sets of measurements. Appendix B contains a sample measurement recording form.

Circumference Site Description

Trunk Circumferences The subject should be standing relaxed, facing the measurer (Figure 4). All of the trunk circumferences (except the neck) are taken with the measuring tape perpendicular (at 90°) to the long axis of the body (Figure 2). Before reading the tape, be sure to observe the front, side and rear aspects of tape placement to ensure that it is level.

1. Neck: Ask the subject to look "straight ahead", so that the head is in a neutral position. Place the tape around the neck at a level just below the larynx (Adam's apple). Because of the shape of the neck, the tape will usually be inclined down toward the front (Figure 5).

2. Shoulder: Locate the clavicle (collar bone) just below the neck, then move your fingers downward until you feel another bone, this is the second rib. Slide inward along the second rib until you contact the sternum (breast bone; the narrow bone in center of chest). You are now touching the second costo-sternal joint (Figure 3a). There is usually a slight bulge or prominence on the sternum at this level. This prominence is called the sternal angle. Place the tape around the shoulders so that it passes over the sternal angle or the second costal-sternal joint (whichever you have identified) and is level with the floor (Figure 3b-e).

3. Chest I (axilla-level): With the subject's arms held slightly away from the body, place the tape around the chest, just below the axilla (underarms) (Figure 6). Ask the subject to relax the arms and shoulders. Be sure the tape hasn't loosened in back following relaxation of the shoulders. Adjust as necessary. Check to see that

Figure 4. SUBJECT STANDING RELAXED

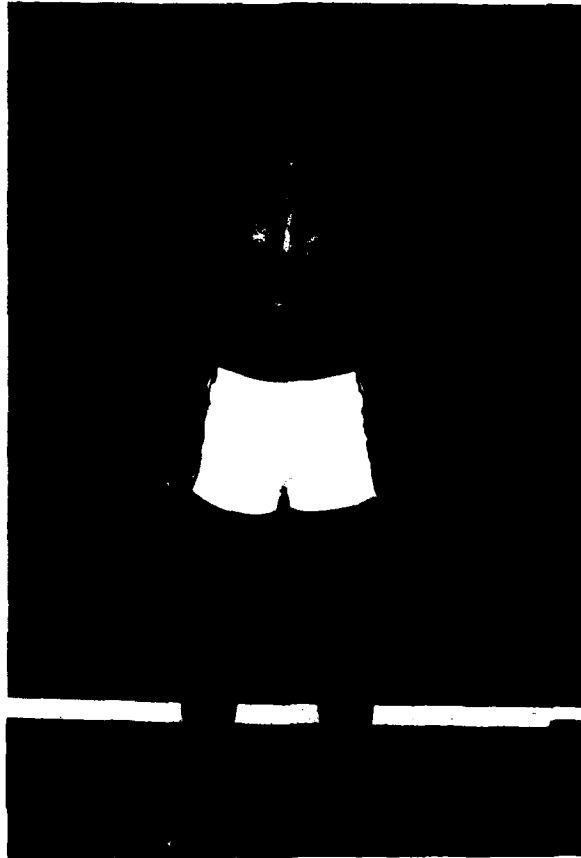


Figure 5. NECK CIRCUMFERENCE



Figure 6. CHEST I CIRCUMFERENCE



Figure 7. CHEST II CIRCUMFERENCE



the tape is level with the floor. Observe that the measurement changes as the subject breathes. Take the measurement at the end of a normal expiration, this will be the smallest measurement observed during normal breathing.

4. Chest II (nipple-line): This measurement is taken on males only. Place the tape around the chest so that it passes over both nipples and is level with the floor (Figure 7). Record the measurement at the end of a normal expiration, this will be the smallest measurement observed.

5. Abdomen I: Visual inspection will usually guide the measurer to the correct placement of the tape at the natural waist. The natural waist is identified as the level of minimal abdominal circumference and is usually located about halfway between the navel and the xiphoid process (lower end of the sternum; that narrow bone in the center of the chest) (Figure 8). When the natural waist is not easily observed, measurements must be taken at several probable sites until the minimal circumference is found. At each measurement check to be sure that the tape is level all the way around. Record the measurement at the end of a normal expiration, this will be the smallest measurement observed during normal breathing.

6. Abdomen II: Place the tape around the abdomen so that it passes over the navel (Figure 9). Check the placement of the tape to make sure that it is level all the way around. Record the measurement at the end of a normal expiration, this will be the smallest measurement observed during normal breathing.

7. Hip: The subject should stand with the heels of the feet together. While facing the subject's right side, place the tape around the hips so that it passes over the greatest protrusion of the

Figure 8. ABDOMEN I CIRCUMFERENCE

(minimal abdominal
circumference)



Figure 9. ABDOMEN II CIRCUMFERENCE



gluteal muscles (buttocks) and is level with the floor (Figure 10). Because the tape passes over clothing in this measurement, extra tension should be applied so that the tape conforms closely to body contours despite the presence of the clothing.

Limb Circumferences All of the arm and leg circumferences are taken on the right side of the body, with the tape measure perpendicular to the long axis of the limb (Figure 2).

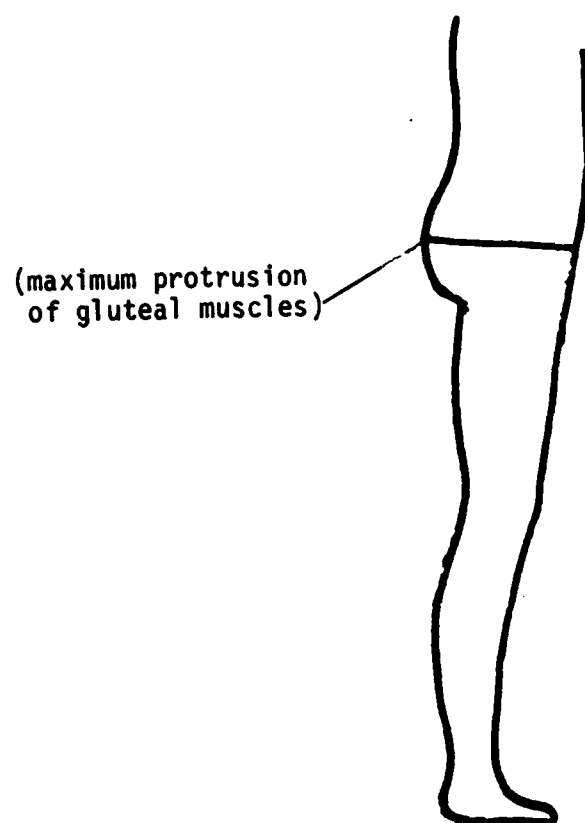
1. Thigh: Ask the subject to stand with feet slightly apart and weight evenly distributed on both legs. Usually, the subject must also roll up the pant leg so that no material will hinder site identification or get caught under the tape. The fold is difficult to see if the subject is actively pulling on the pant leg, so try to avoid this situation. While facing the subject's right side, observe the gluteal fold where the thigh joins the buttocks (Figure 11a,b). Place the tape around the thigh so that it passes immediately beneath but does not touch the gluteal fold. Observe both side and front position of the tape and adjust (if necessary) so that the tape is perpendicular to the long axis of the thigh (Figure 11c).

2. Calf: Ask the subject to stand with feet slightly apart and weight evenly distributed on both legs. Place the tape around what appears to be the greatest circumference of the calf (Figure 12). Gently release the tension and slide the tape short distances both above and below the original site (see Figure 15a for illustration of sliding technique); observe each measurement and record the largest one.

3. Biceps (arm extended): While the subject extends his/her arm straight out to the side, parallel to the floor, with palm upward and

Figure 10.

HIP CIRCUMFERENCE

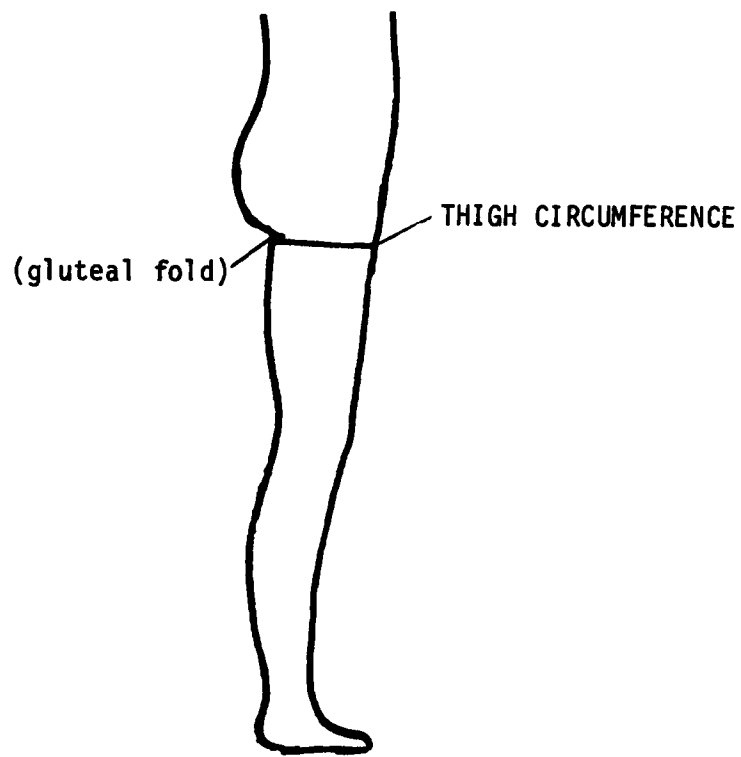


(a) Location of hip circumference site



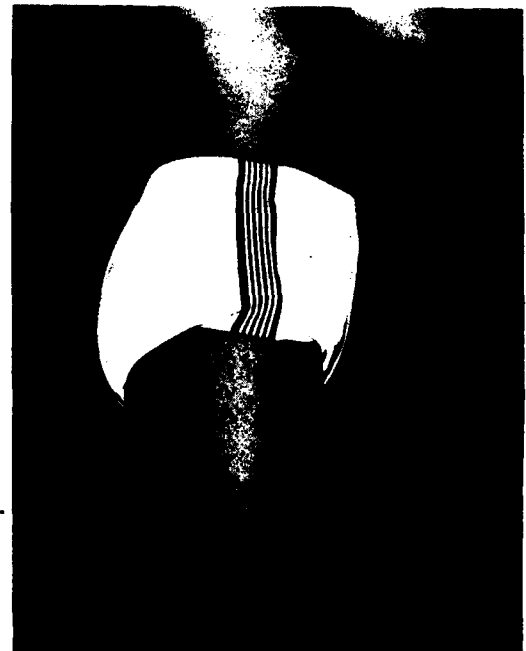
(b) Measuring the hip circumference

Figure 11. THIGH CIRCUMFERENCE



(a) Location of the thigh circumference site

(gluteal fold).



(b) Observing the gluteal fold

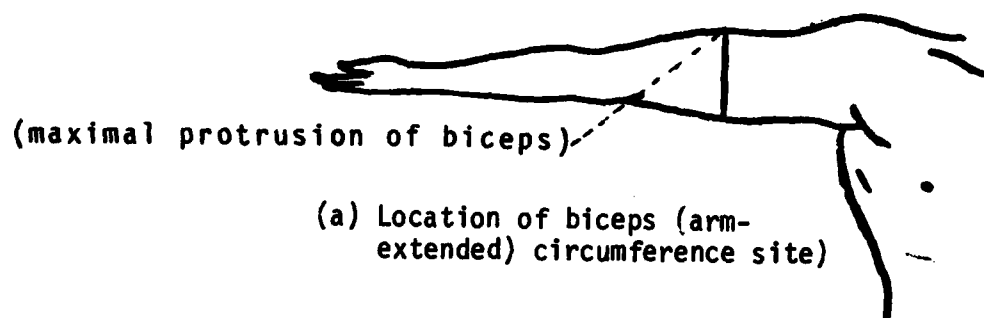


(c) Measuring the thigh circumference

Figure 12. CALF CIRCUMFERENCE



Figure 13. BICEPS (arm extended) CIRCUMFERENCE



(b) Measuring the biceps (arm extended) circumference

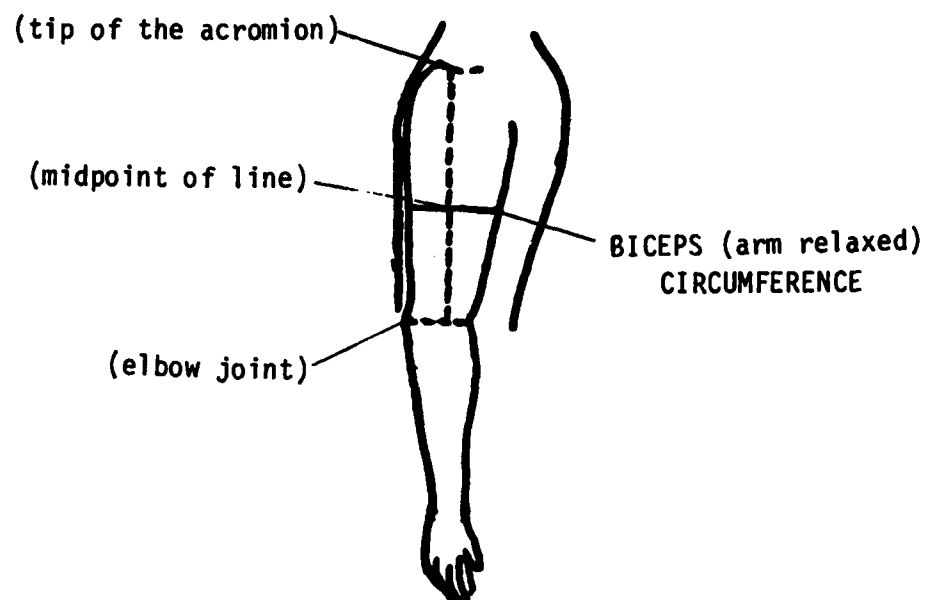
elbow locked in extension, place the tape around the greatest protrusion of the biceps (the biceps is the largest muscle on the front of the upper arm) (Figure 13).

4. Biceps (arm relaxed): The bony prominence which can be felt at the very top of the shoulder is called the acromion. The outer margin or tip of the acromion is one of the major landmarks used for location of measurement sites on the arm (Figures 14 and 21). To locate the tip of the acromion, place your fingers on the top of the shoulder and feel your way out to the lateral edge of the bone. This is the tip of the acromion. The subject should stand with arms relaxed at the side. Face the subject's right side and place the tape around the subject's arm halfway between the tip of the acromion and the elbow (Figure 14).

5. Forearm: The subject should stand with arms relaxed at the side. Face the subject's right side and place the tape around what appears to be the largest circumference of the forearm (usually just below the elbow) (Figure 15). Gently release the tension and slide the tape (using the middle finger of each hand) short distances both above and below the original site (Figure 15a); observe each measurement and record the largest one.

6. Wrist: The subject should stand with arms relaxed at the side and the wrist in a neutral position (neither flexed nor extended). Face the subject's right side and place the tape around the wrist, above the hand and just below the lower ends of the bones of the forearm (Figure 16).

Figure 14. BICEPS (arm relaxed) CIRCUMFERENCE



(a) Location of the biceps (arm relaxed) circumference



(b) Measuring the biceps (arm relaxed) circumference

Figure 15. FOREARM CIRCUMFERENCE



(a) Hand position used in sliding the tape to find the maximum circumference of the forearm (middle finger of each hand guides a side of the tape)



(b) Measuring the forearm circumference

Figure 16. WRIST CIRCUMFERENCE



MEASUREMENT OF SKINFOLDS

Equipment and Procedure

Skinfold measurements assess the thickness of skin and fat tissue at various sites on the body. The objective of measuring skinfold thicknesses is to assess the amount of fat deposited under the skin.

Calipers Skinfold thicknesses are measured using calipers designed for this purpose (Figure 17). The calipers have a set of jaws (or branches) which are opened and then allowed to close so as to surround the skinfold. They are closed by spring pressure. Small metal plates called branch plates are attached to the ends of the jaws. It is the branch plates which actually contact the skin. Several brands of accurate and reliable skinfold calipers are available (Appendix A). Some calipers (e.g., Harpenden) can and should be calibrated regularly. To do so, loosen the dial set screw and rotate the dial until it reads zero when the caliper branches are in their resting position, then retighten the set screw. Occasionally, calipers will need to be sent to authorized service facilities to adjust spring tension and maintain overall accuracy.

Technique For ease and accuracy of measurement, male subjects should wear swim suits or shorts and female subjects should wear "two-piece" swim suits. All skinfolds are taken on the right side of the body, with the subject standing relaxed. To obtain a skinfold measurement, a fold of skin and subcutaneous fat is picked up firmly between the thumb and forefinger of the left hand and pulled away from the underlying muscle (Figure 18). The fold should be large enough so

as to include all tissue overlying the muscle, but not so large that the sides of the fold do not become parallel under firm pressure. The skinfold caliper is held in the right hand and applied so that the edges of the branch plates are located about 1 cm (3/8 inch) below the fingers holding the fold. The depth of the caliper application should be such that the branch plates are centered on an imaginary line running parallel to the long axis of the fold and through the center of the finger pads holding the fold. The caliper is released gently, but fully, so that the jaws exert their maximum pressure. The fold is held firmly with the thumb and forefinger of the left hand throughout caliper application. Once maximum pressure is applied, the caliper reading will decline gradually as the tissue becomes compressed. The rate of this decline depends on the size and compliance of the skinfold tissue. The caliper reading is taken between 2 and 3 seconds after full pressure is applied (even though the needle may still be moving). In order to assure measurement reproducibility, it is important that the caliper be read at the proper time.

In most people, the tissue of the skinfold is highly compressible. Erroneously small readings may occur when a measurement is taken after repeated manipulation of the skinfold (e.g. repeated, consecutive attempts to pick up a fold at the same site), or when insufficient time is allowed between measurements at the same site. In order to obtain reproducible results, at least two minutes should be allowed between skinfold measurements at the same site.

To ensure accuracy of site location it is necessary to find the landmarks described, and to actually touch them as you visually locate the fold site.

Figure 17. HARPENDEN SKINFOLD CALIPER

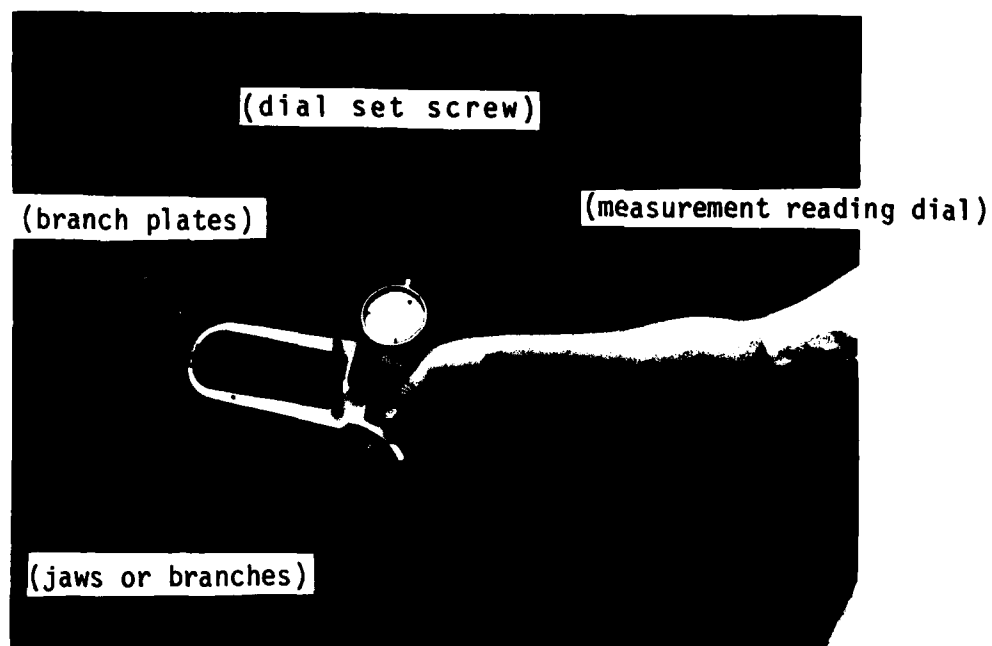
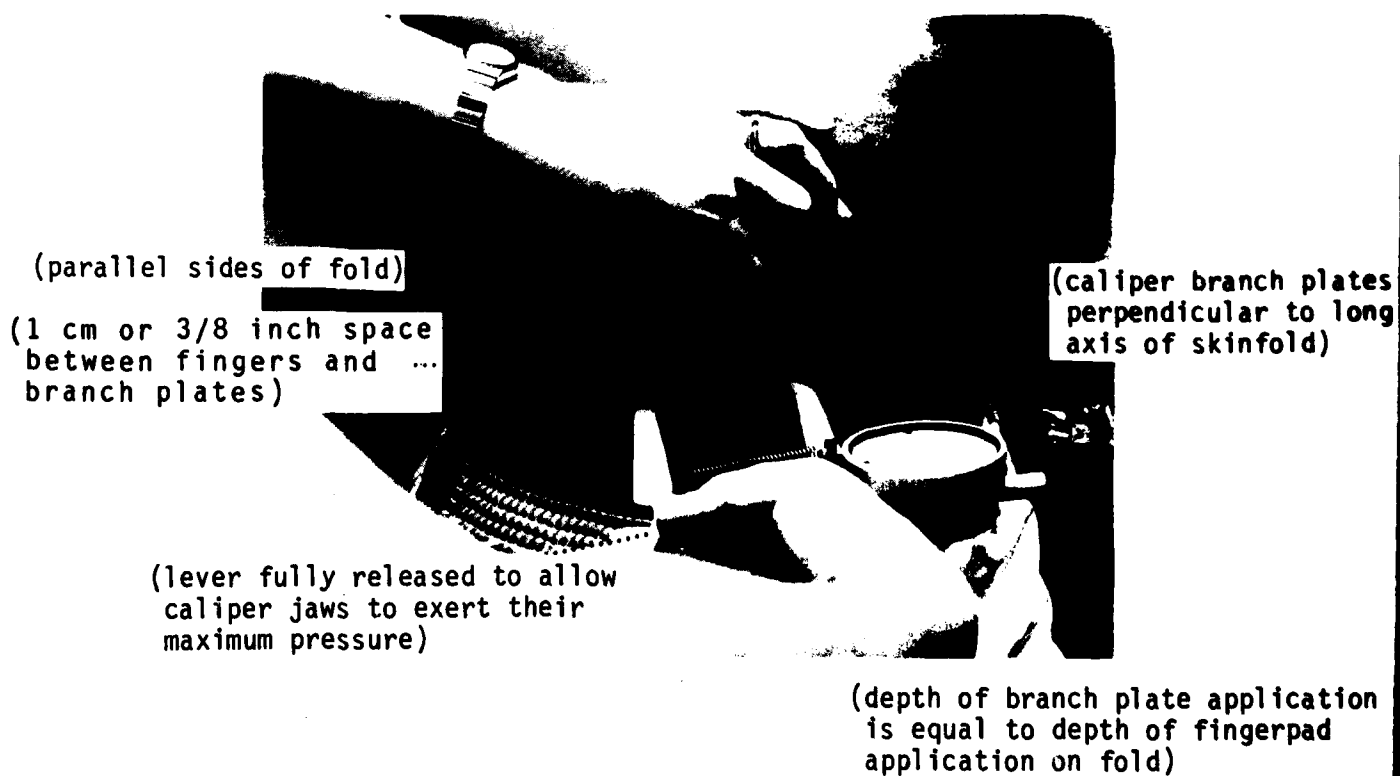


Figure 18. SKINFOLD CALIPER APPLICATION



Measurement Recording Depending on the caliper being used, measurements are recorded to the nearest 0.1 mm or 0.5 mm. Instrument dials for Harpenden and Lange calipers are illustrated in Figures 19 and 20. Hash marks are located every 0.2 mm on the Harpenden dial and measurements can be recorded to the nearest 0.1 mm by reading the space between the marks. One full revolution of the large needle corresponds to 20 mm, while two revolutions corresponds to 40 mm. Note that during the first revolution the small needle is between 0 and 2, while during the second revolution the small needle is between 2 and 4. The Harpenden caliper is accurate for skinfolds up to 50 mm. The Lange caliper is accurate for skinfolds up to 70 mm (Figure 20). Hash marks are located every 1 mm on its dial and measurements can be read to the nearest 0.5 mm (half way between hash marks). Use Figures 19 and 20 to test your ability to read the dials correctly. Accurate and reliable measurements can only be obtained if you are able to read the caliper dial quickly and correctly.

Take each measurement in sequence, then repeat the whole series in order. In this way you will usually avoid errors due to frequent, repeated measurements. Under ideal conditions the measurer will have an aide who will record measurements as well as observe for good technique and accurate location. If the second measurement at a site differs from the first by more than 5%, a third measurement should be taken.

Example:

Site	Trial 1	Trial 2	Trial 3	Average
Biceps skinfold	<u>6.4</u>	<u>6.0</u>	<u>6.3</u>	<u>6.23</u>
Triceps skinfold	<u>14.0</u>	<u>14.7</u>	—	<u>14.35</u>

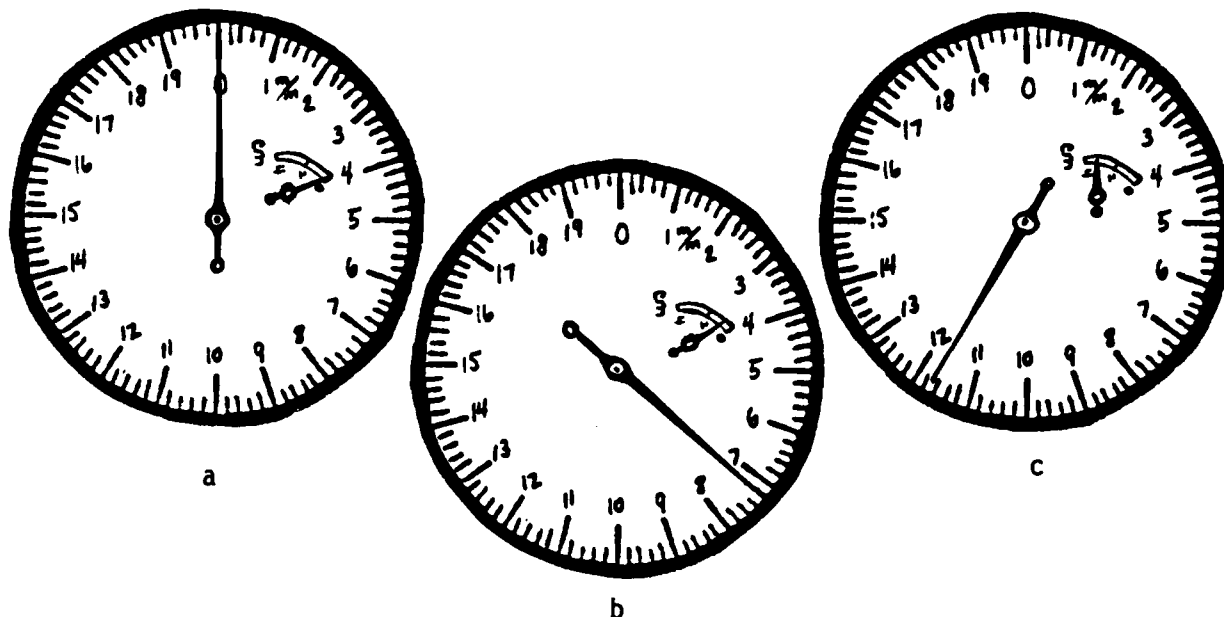


Figure 19. Harpenden caliper dial readings. Hash marks show 0.2 mm increments. Smaller needle shows whether large needle is in its first or second revolution. a) 0 mm, resting position; b) 7.2 mm; c) 31.7 mm, large needle is in its second revolution so 20 mm must be added to the actual dial reading (11.7) to obtain true measurement (31.7 mm).

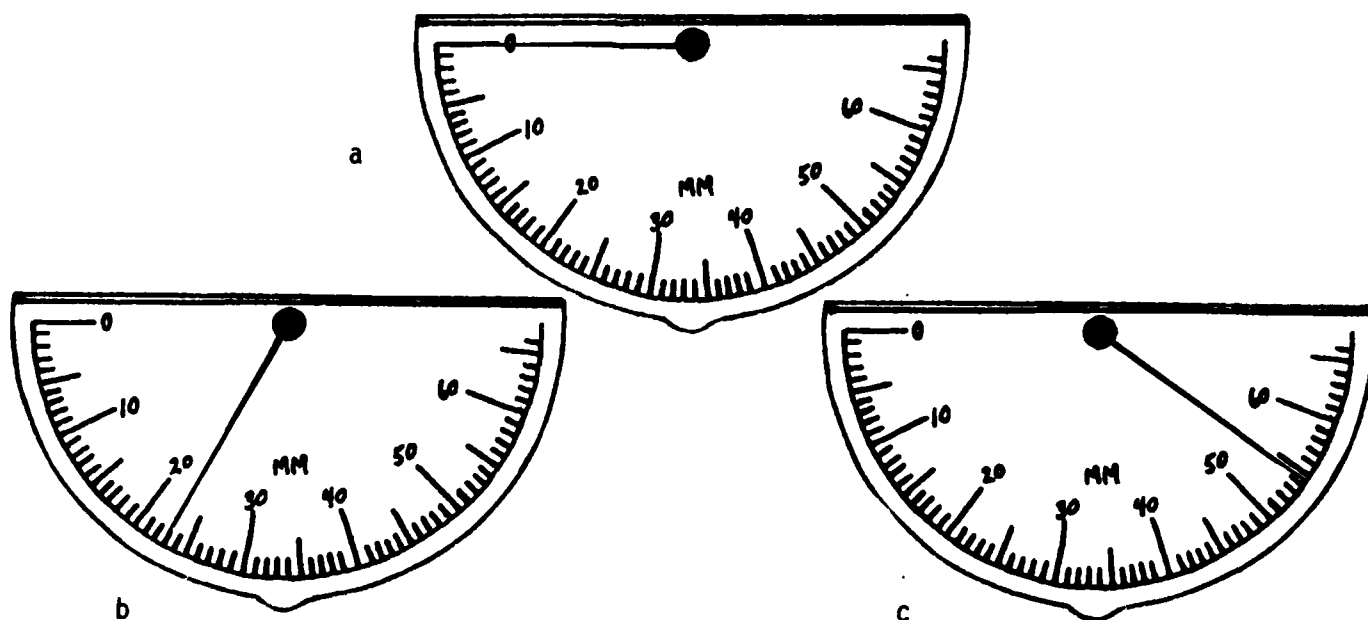


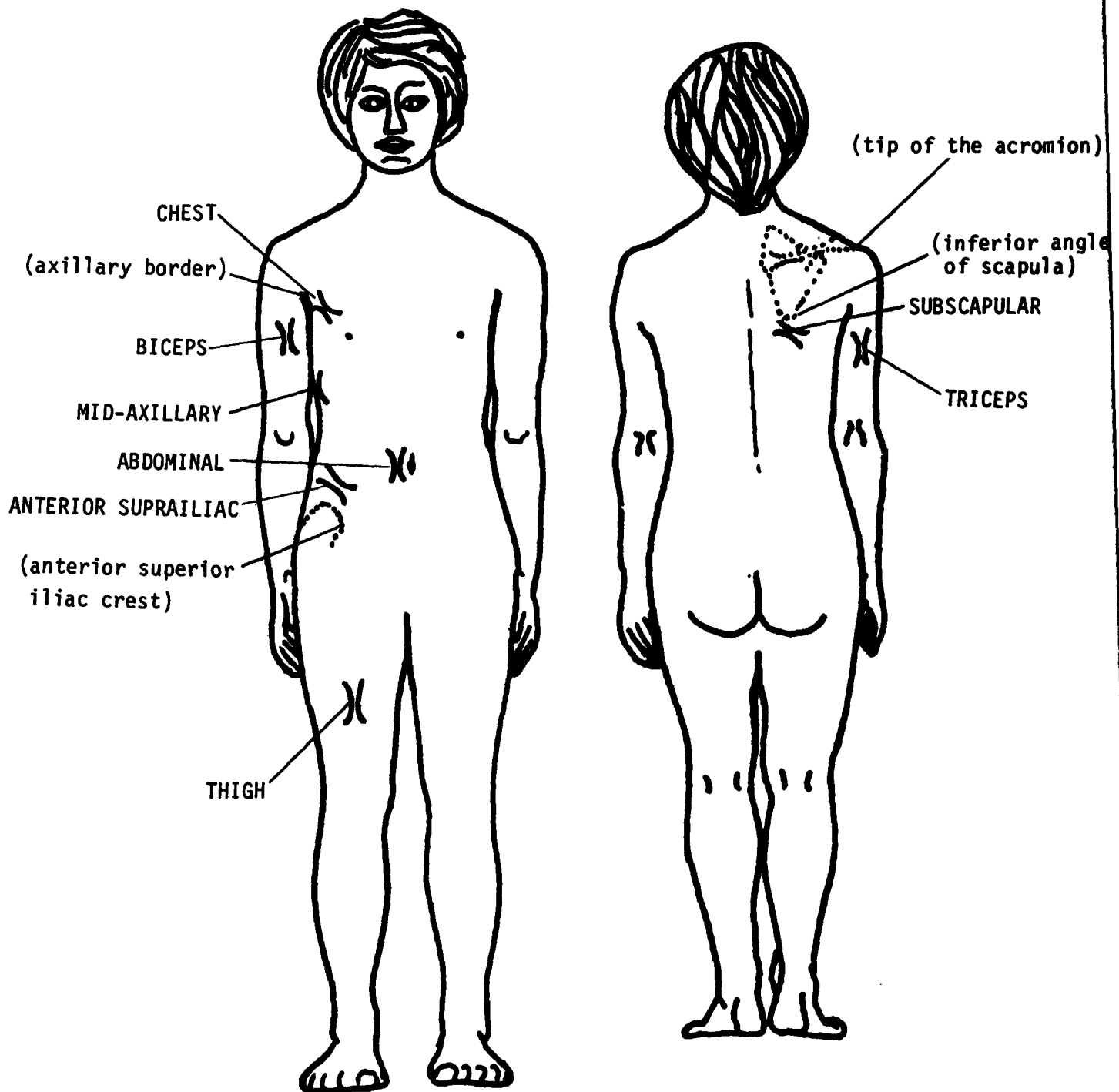
Figure 20. Lange caliper dial readings. Hash marks show 1.0 mm increments. a) 0 mm, resting position; b) 23.0 mm; c) 54.5 mm (needle is halfway between 54.0 and 55.0 mm).

The biceps skinfold was measured a third time because the difference between the first and second trials (0.4 mm) was greater than 5% of the first trial ($6.4 \text{ mm} \times 0.05 = 0.32 \text{ mm}$). The triceps skinfold was not measured a third time because the difference between the first two measurements (0.7 mm) was not greater than 5% of the first measurement ($14.0 \text{ mm} \times 0.05 = 0.7 \text{ mm}$). The final measurement for a site is an average of all recordings for that site.

A common error is misreading the caliper dial by reading the scale in the wrong direction or by reading the wrong tens unit (e.g., reading Figure 19c as 11.7 instead of 31.7 mm). Often, these errors are caught when comparison of first and second measurements reveals a very large discrepancy (e.g., more than 10 mm difference). In this case, additional measurement(s) should be taken and the misread value should be excluded from final averaging.

In order to obtain unbiased results, it is important for the measurer to be unaware of his/her previous measurements at each particular site. To accomplish this, the recorder should report only whether or not a third measurement is needed, not the actual previous values. If no recorder is available, the measurer should use a piece of paper to mask previous recordings while taking the second and third (if necessary) sets of measurements. Appendix B contains a sample measurement recording form.

Figure 21. SKINFOLD SITES



(Modified from W.D. Ross & N.C. Wilson,
Simon Frazer Univ., B.C., Canada, 1973)

Skinfold Site Description

All of these measurements are taken on the right side of the body (Figure 21). The fold is picked up at the site described and the calipers are placed about 1 cm (or 3/8 inch) below the fingers holding the fold.

1. Biceps: The subject's arm should be hanging relaxed at the side. While touching the tip of the acromion (see Figure 21 and biceps-arm relaxed circumference for how to locate acromion) with your left hand and the line of the elbow joint with the tip of the caliper jaws (Figure 22a), visualize a point on the midline of the front of the arm, halfway between the tip of the acromion and the elbow (Figure 22b). Pick up the biceps skinfold at this point with the fold running parallel to the long axis of the arm (Figure 22c).

2. Triceps: The subject's arm should be hanging relaxed at the side. While touching the tip of the acromion (see biceps-arm relaxed description) with your left hand and the line of the elbow joint with the tip of the caliper jaws (Figure 23a), visualize a point on the midline of the back of the arm, halfway between the tip of the acromion and the elbow (Figure 23b). Pick up the triceps skinfold at this point with the fold running parallel to the long axis of the arm.

3. Subscapular: The fold is taken just below the inferior angle (lower tip) of the scapula (shoulder blade). With your left thumb, locate the inferior angle of the scapula (Figure 24a). Ask the subject to relax the shoulders if you have difficulty finding this landmark. Starting with your thumb on the inferior angle, slide your thumb down 1 cm (or 3/8 inch). Rotate your hand clockwise so that you can pick up a fold that is directed downwards and outwards at a 45 degree angle (Figure 24b).

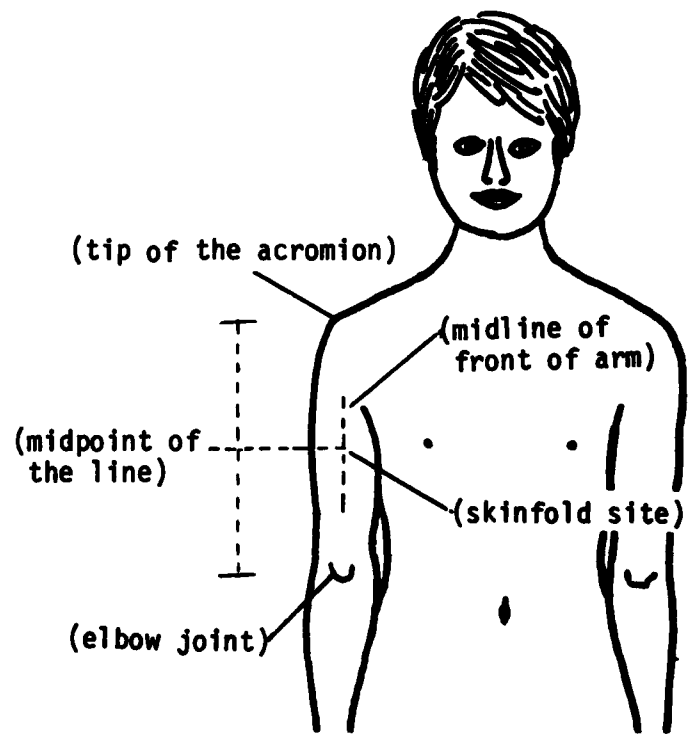
Figure 22. BICEPS SKINFOLD



(a) Locating landmarks and visualizing the mid-point of the line



(c) Measuring the biceps skinfold

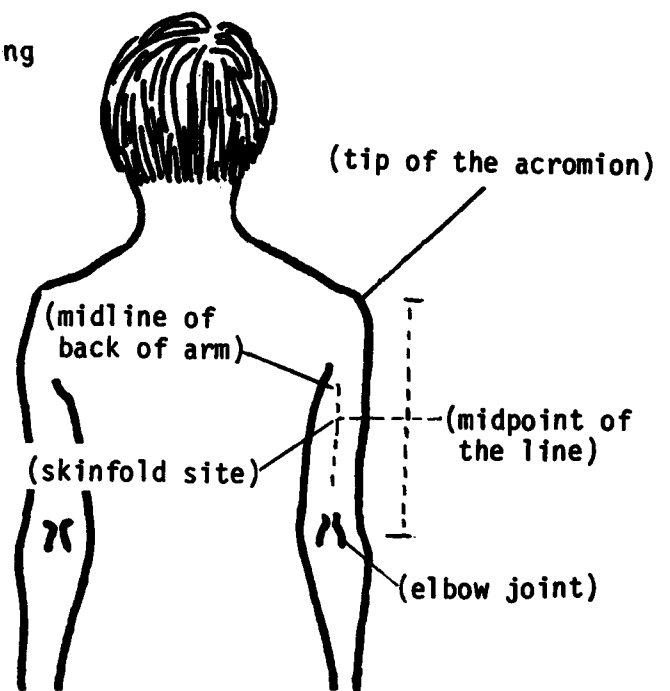


(b) Location of biceps skinfold site

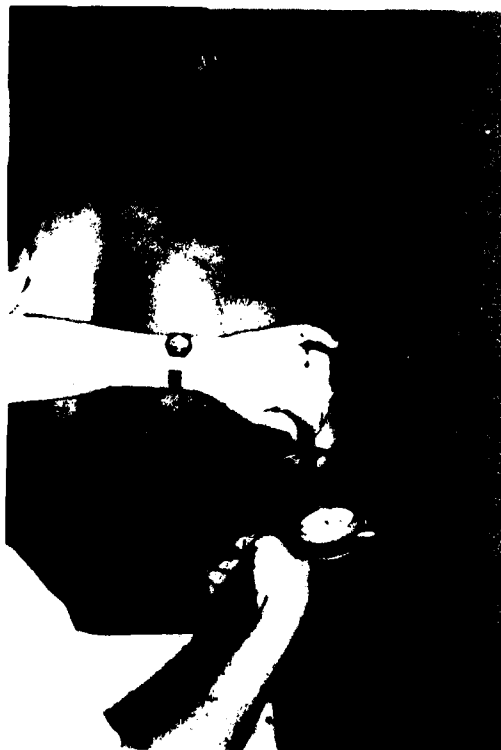
Figure 23. TRICEPS SKINFOLD



(a) Locating landmarks and visualizing the midpoint of the line



(b) Location of triceps skinfold site



(c) Measuring the triceps skinfold

Figure 24. SUBSCAPULAR SKINFOLD



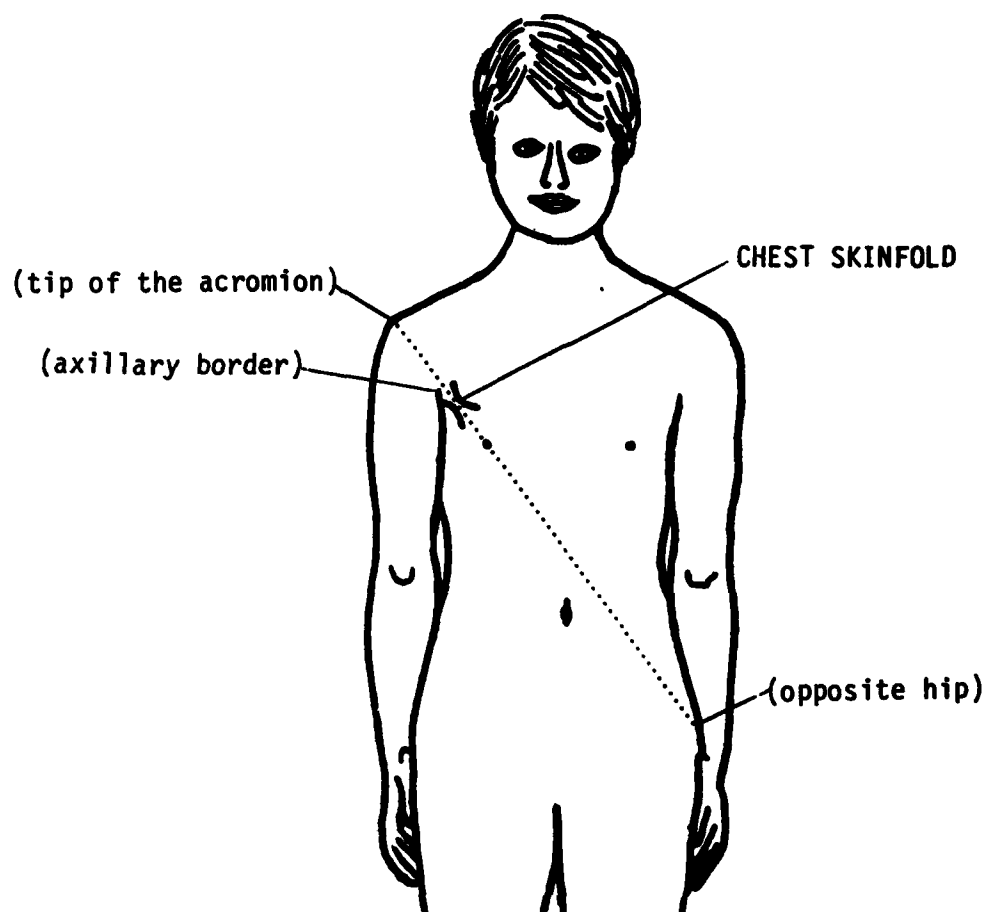
(inferior angle
of scapula)

(a) Finding the inferior
angle of the scapula



(b) Measuring the subscapular skinfold

Figure 25. CHEST SKINFOLD



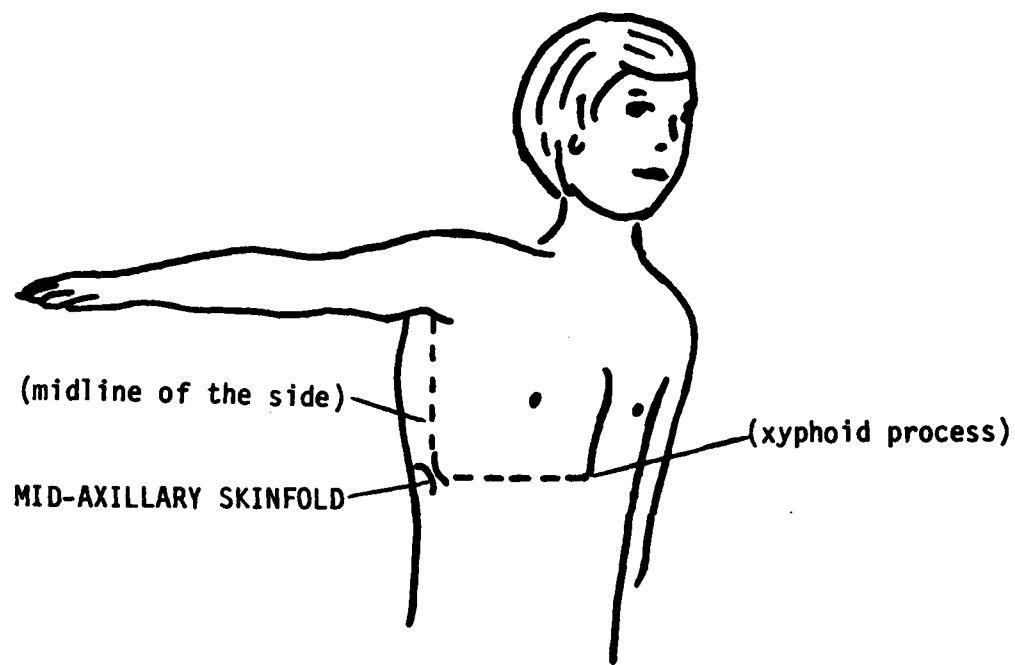
(a) Location of chest skinfold site



(b) Measurement of chest skinfold

Figure 26.

MID-AXILLARY SKINFOLD



(a) Location of the mid-axillary skinfold site



(b) Locating the level of the xyphoid process at the midline of the side



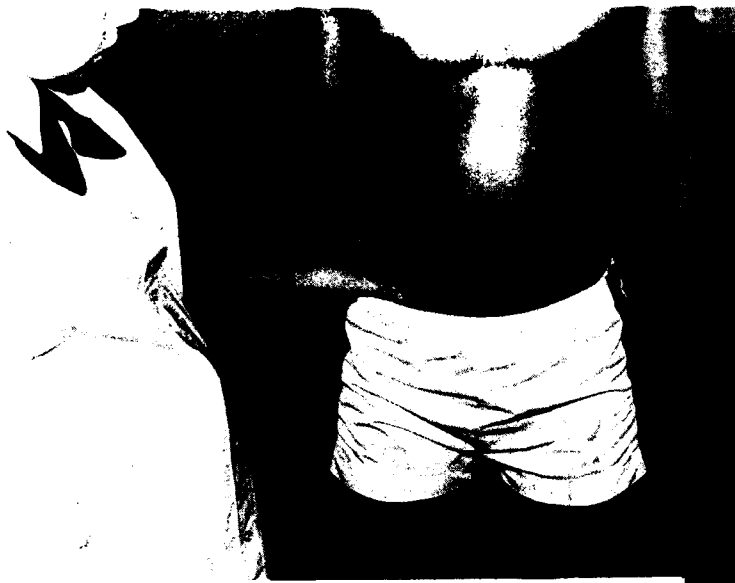
(c) Measuring the mid-axillary skinfold

4. Chest: Pick up the chest skinfold adjacent to the axillary border (junction of the arm and the trunk) with the fold running along an imaginary line between the tip of the acromion and the opposite hip (Figure 25).

5. Mid-axillary: The fold is taken on the midline of the right side of the body at the level of the xyphoid process (the lower end of the sternum or breastbone) (Figure 26a). Start by facing the right side of the subject's body with the subject's arm extended straight out to the side and parallel to the floor. Locate the xyphoid process with the middle finger of your right hand. It is usually felt on the body midline in the recess formed where the lower rib cartilages join the sternum. Gently touch this point with the tip of the caliper (Figure 26b). Now visualize a point on the midline of the subject's side at the level of the xyphoid process. Pick up the mid-axillary skinfold at this point. The fold should run forward and downward so that it follows the line of the rib (Figure 26c).

6. Anterior suprailiac: First locate the anterior superior iliac spine. To do this, find the uppermost protrusion of the pelvis at the right side of the body. Then follow the bony ledge forward and downward until it suddenly "drops off" or ends. The anterior superior iliac spine is located at the "drop off" (Figure 27a). Gently touch this landmark with the tip of the caliper while your left hand touches the axillary border (junction of the arm and trunk). Now, imagine a line running between your left hand and the caliper tip (Figure 27b). Visualize a point on this line 5 to 7 cm (or 2 to 2 1/2 inches) from the anterior superior iliac spine. At this point, pick up a fold that runs downward and inward at a 45 degree angle (Figure 27c).

Figure 27. ANTERIOR SUPRAILIAC SKINFOLD



.....(anterior superior iliac spine)

(a) Finding the anterior superior iliac spine



(axillary border).....
(skinfold site).....
(anterior superior iliac spine).....

(b) Locating landmarks
and visualizing the
imaginary line
connecting them



(c) Measuring the anterior suprailiac skinfold

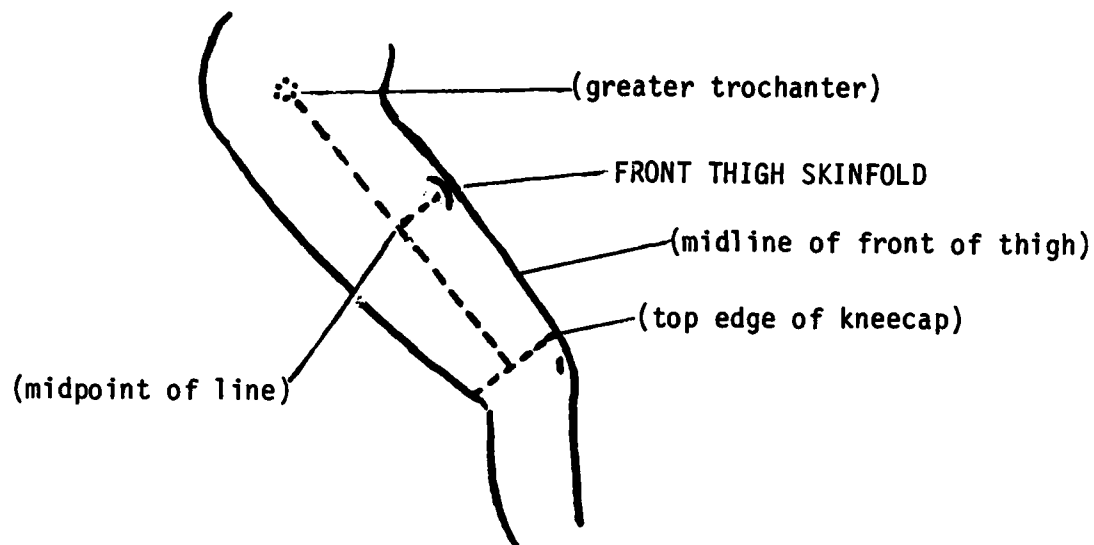
Figure 28. ABDOMINAL SKINFOLD



7. Abdominal: Pick up the abdominal skinfold so that its long axis is located 3 to 5 cm (or 1 to 2 inches) to the right of the navel with the fold running in a vertical direction (parallel to the long axis of the body) (Figure 28).

8. Front thigh: Ask the subject to stand with all weight on the left leg and with the right leg slightly bent, thigh muscles relaxed, and the foot resting lightly on the floor. Find the greater trochanter of the femur (knobby protrusion of the thigh bone) at the upper end of the side of the thigh. This is the body part that hurts when you go camping and try to sleep on your side on the hard ground. For men, it is located at about the level of the middle of the buttocks, for women, it is a little lower (Figure 29a). With your left hand touching the greater trochanter and the caliper tip touching the side of the knee at the level of the top edge of the kneecap, imagine a line running down the side of the thigh between these two landmarks. Visualize the midpoint of this line, transfer it to the midline of the front of the thigh (Figure 29a,b), and pick up the skinfold so that it runs parallel to the long axis of the thigh (Figure 29c).

Figure 29. FRONT THIGH SKINFOLD



(a) Location of front thigh skinfold site



(b) Locating landmarks and visualizing the midpoint of the line connecting them

(c) Measuring the front thigh skinfold

REFERENCES

- Behnke, A.R., and J.H. Wilmore. Evaluation and Regulation of Body Build and Composition. Prentice-Hall, Inc., Englewood Cliffs, NJ, 1974.
- Carter, J.E.L. (ed) Physical Structure of Olympic Athletes, Part I: Montreal Olympic Games Anthropological Project. S. Karger, Basel, Switzerland, 1982.
- Yuhasz, M.J. Physical Fitness Manual. University of Western Ontario, London, Canada, 1974.

References for Specific Measurements

- Behnke and Wilmore (1974): Biceps, triceps, and chest skinfolds; neck, shoulder, chest II, abdomen I and II, thigh, calf, biceps (extended arm), and wrist circumferences.
- Carter (1982): Subscapular, anterior suprailiac, abdominal, and thigh skinfolds; biceps (relaxed arm) circumference.
- Yuhasz (1974): Mid-axillary skinfold.

APPENDIX A

Anthropometric Instruments

Skinfold caliper suppliers:

Harpenden Skinfold Caliper
H. E. Morse Co.
455 Douglas Ave.
Holland, MI 49423
(616) 396-4604
Cost: \$230

Lafayette Skinfold Caliper
Lafayette Instrument Co.
P.O. Box 5729
Lafayette, IN 47903
(317) 423-1505
Cost: \$125

Lange Skinfold Caliper
Cambridge Scientific Industries
P.O. Box 265
Cambridge, MD 21613
(800) 638-9566/(301) 228-5111
Cost: \$165

Slimguide Caliper
Creative Health Products
5148 Saddle Ridge Rd.
Plymouth, MI 48170
(313) 453-5309
Cost: \$19.95

Tape measure suppliers:

Retractable fiberglass measuring
tape
Buffalo Medical Specialties
Available thru local distributors
(eg. Burlingame Surgical Supply Co.
1515 4th Ave., San Diego, CA 92101
(619) 231-0187)
Cost: \$3.80

Scoville-Dritz fiberglass measuring
tape
Available thru local distributors
or from Quinton Instruments, 2121
Terry Ave., Seattle, WA 98121
(800) 426-0538/(206) 223-7373
Cost: \$3.75

Flexible, retractable, steel tape
Keuffel and Esser Co. Model No.
860358
Available thru local engineering
supply distributors (eg. San Diego
Blueprint, 4696 Ruffner Rd., San
Diego, CA 92111
(619) 565-4696)
Cost: \$17

APPENDIX B

SAMPLE MEASUREMENT RECORDING FORM

DATE: _____ NAME: _____
 SEX: _____ RANK/RATE: _____
 AGE: _____ PAYGRADE: _____
 RACE: _____ OCCUPATION OR WORK SPACE _____

Stature:

Height _____ in _____ cm
 Weight _____ lbs _____ Kg

Skinfolds:

Biceps	_____	_____	_____
Triceps	_____	_____	_____
Subscapular	_____	_____	_____
Chest	_____	_____	_____
Mid-axillary	_____	_____	_____
Suprailiac	_____	_____	_____
Abdominal	_____	_____	_____
Thigh	_____	_____	_____

Circumferences:

Neck	_____	_____	_____
Shoulder	_____	_____	_____
Chest-axilla level	_____	_____	_____
Chest-nipple line (males)	_____	_____	_____
Abdomen (1)	_____	_____	_____
Abdomen (2)	_____	_____	_____
Hip	_____	_____	_____
Thigh	_____	_____	_____
Calf	_____	_____	_____
Biceps (arm extended)	_____	_____	_____
Biceps (arm relaxed)	_____	_____	_____
Forearm	_____	_____	_____
Wrist	_____	_____	_____

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) (U) Anthropometry is measurement of the human body. It can be used to estimate body composition, to describe body build, and in the design of equipment to match human form. This report provides complete instructions for the measurement of 12 body circumferences and 8 skinfolds. When used as a teaching device, this report will allow previously untrained personnel to perform anthropometry in an accurate and reliable manner.		

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